

**APPENDIX 10A: USER INSTRUCTIONS FOR SHIPMENTS AND NIA  
SPREADSHEET MODEL**

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## **APPENDIX 10A: USER INSTRUCTIONS FOR SHIPMENTS AND NIA SPREADSHEET MODEL**

### **10A.1 USER INSTRUCTIONS**

The results obtained in the shipments and national impact analysis (NIA) analyses can be examined and reproduced using the Microsoft Excel spreadsheet available on the U.S.

Department of Energy's (DOE) website at:

[http://www.eere.energy.gov/buildings/appliance\\_standards/commercial/dist\\_transformers.html](http://www.eere.energy.gov/buildings/appliance_standards/commercial/dist_transformers.html)

The spreadsheet is called “NIA\_DT\_NOPR.xls” and it enables the user to perform a national impact analysis of distribution transformer standards for both the liquid-immersed and dry-type equipment classes. To run the spreadsheet, the user needs to have Microsoft Excel 2000 or a later version.

The NIA spreadsheet performs calculations to forecast the changes in national energy use and net present value due to an energy-efficiency standard. The energy use and associated costs for a given standard are determined first by calculating the shipments and then calculating the energy use and costs for a product class. The differences between the standards and base cases (absent a national standard) can then be compared and the national energy savings (NES) and net present values (NPV) determined. The NIA spreadsheet, or workbook, consists of the following worksheets:

#### **Introduction**

This worksheet provides an outline of the contents of the entire national impact spreadsheet and describes the function of individual worksheets.

#### **Model Flowchart**

This worksheet presents a flowchart of the shipments and the NES/NPV modules.

#### **CSL Definitions and DL-PC Mapping**

This worksheet defines efficiency levels for candidate standard levels (CSLs) by design lines and provides design lines-to-product classes mapping.

#### **Ship-NES-NPV Output**

This worksheet presents the consolidated outputs produced for each product class when the user click the button “All Classes” on

the “National Impact Summary” worksheet. Total savings and NPV for the forecast period are summarized in tables for each standard level.

**National Impact Summary** This worksheet contains user input selections and a summary table containing cumulative shipments, cumulative energy savings, and NPV for each trial standard level (TSL). This worksheet also graphically summarizes the energy and economic savings resulting from standards.

### **Energy Impacts from TSLs - Charts**

This worksheet displays the savings charts for years 2010 through 2038 for all the TSLs when the user runs a specific scenario or a product class in the “National Impact Summary” sheet.

**Annual Impacts** This worksheet makes several calculations for the base case as well as for all the TSLs. Savings are calculated as the difference between the base case and the TSL energy consumption.

### **Shipments Forecast across TSLs**

This worksheet compiles the shipments forecast from the stock sheets (see below) for years 2010 through 2038 for all the TSLs. The output of this worksheet corresponds to the product class for which the model is run.

**Shipments Charts** The shipments forecast charts for the liquid-immersed and dry-type transformers are contained in the “LT Shipments Charts” and “DT Shipments Charts” worksheets.

**Shipments Data** This worksheet calculates total historical shipments for years 1977 through 2000 and forecasts shipments for years 2004 through 2038. These shipments are calculated for both liquid-immersed and dry-type transformers.

**Stock Sheets** There are 14 stock sheets (7 for liquid-immersed and 7 for dry-type) for the base case and the 6 TSLs. Each stock sheet calculates the shipments, retirements, and affected stock in a particular year.

<b>Lifetime</b>	This worksheet contains the transformer reliability function and produces the retirement rates. The probabilities of retirement generated in this worksheet are used to calculate the annual retirements in the stock sheets.
<b>LCC Data by Product Class</b>	This worksheet contains energy loss (or consumption) and first cost data for different product classes. As the name suggests, the data for this worksheet come directly from the life-cycle cost (LCC) analysis. The load growth calculations for liquid-immersed and dry-type transformers are also done in this sheet.
<b>CSL-TSL Mapping</b>	This worksheet maps the various CSLs for design lines into TSLs for product classes. The worksheet also re-scales the losses and costs for representative units of a design line, using the 0.75 scaling factor in the sheet. These data are then aggregated into product classes in the “LCC Data by Product Class” worksheet.
<b>LCC Input Data</b>	Data in this worksheet are the mean values for the different variables from the Monte Carlo simulation runs of the LCC for individual design lines.
<b>Market Share Data</b>	This worksheet contains the market shares of the different transformer design lines. This worksheet also calculates the 0.75 scaling factors for each design line.
<b>Site2Source</b>	This worksheet contains the conversion factors for calculating source energy from site energy.
<b>EIA Electricity Sales Data</b>	This worksheet contains the historical and forecasted retail electricity sales data (obtained from DOE's Energy Information Administration (EIA)).
<b>Annual Energy Price Forecast</b>	This worksheet contains the <i>AEO2005</i> <sup>1</sup> forecast data for the electric power sector for the different economic growth scenarios (i.e., reference, high, and low). This forecast is used to estimate future growth in shipments.

Basic instructions for operating the NIA spreadsheet are as follows:

1. After downloading the NIA spreadsheet file from DOE's website, open the file using Excel. At the bottom, click on the tab for the worksheet "National Impact Summary." This worksheet serves as the user interface for running the model for a particular product class. To provide flexibility, the spreadsheet permits some user modifications to the model. The user may select a particular macroeconomic forecast which determines fuel prices, electricity sales, and income data to be used by the model. The user may also directly input new values for implicit discount rates, which quantify consumer preference for immediate, instead of delayed, savings. Additionally, the user can select long-term purchase elasticities for transformers.
2. Use Excel's View/Zoom commands at the top menu bar to change the size of the display to make it fit your monitor.
3. The user can change the model parameters listed in the gray box labeled "Inputs." The parameters are:
  - a. Economic Growth: To change the value, use the drop-down menu. Select the desired growth level (Reference, Low, or High).
  - b. Discount Rate: To change the value, select cell E8. Type in the desired discount rate.
  - c. Elasticity Liquid-Immersed Type: To change the value, use the drop-down menu to pick a level (Medium, High, Low).
  - d. Elasticity Dry-Type: To change the value, use the drop-down menu to pick a level (Medium, High, Low).
4. The user can now select the desired product class from the drop-down menu and view the results in the summary table for that product class. To produce results for all product classes, the user will need to click the "All Classes" button. When the user gets a message saying "Done," the calculations are complete. Results from this run will be available in "Ship-NES-NPV Outputs" worksheet.
5. The spreadsheet also has a feature that enables the user to produce annual impacts for all product classes in a single workbook by clicking the "Output All Classes Annual" button. The output for this utility is produced in a separate workbook called "annual\_impacts-output.xls."

**REFERENCE**

1. U.S. Department of Energy - Energy Information Administration. *Annual Energy Outlook 2005: With Projections Through 2025*. January, 2005. Washington, DC. Report No. DOE/EIA-0383(2005). <<http://www.eia.doe.gov/oiaf/aeo/index.html>>